CALL WAITING INDICATOR

Technical Field

This invention relates to telecommunications systems which provide an indication to a user
5   of a waiting call when a first call is active.

Background Art

Current digital exchanges are capable of maintaining two or more calls to the same end user.
Typically, a user will be involved in a call to or from a remote first party via the exchange
10   when a second party tries to telephone the user. The user's local public switched telephone
network (PSTN) exchange receives the second call and places it on hold. A characteristic
audio tone is added to the signal of the first telephone call as an indication to the user that a
call is waiting, and typically the exchange will also play a recorded message to the second
caller indicating that the user's line is busy but that a "call waiting" indication has been sent
15   to the user.

Because many people now use a single telephone line for both voice telephony calls and data
sessions from a computer (e.g. Internet access), it is frequently necessary for the user to
disable the call waiting facility due to the fact that the call waiting tones can cause the
20   Internet connection to be lost. Indeed, the current most widely used Web browser software,
Microsoft Internet Explorer (Trade Mark) recommends disabling call waiting facilities as a
possible fix to Internet connection problems in its troubleshooter program.

Even if the call waiting tone does not cause the Internet connection to be lost, there is still a
25   problem in that a user with an active Internet connection has no way of knowing whether or
not a call is waiting. In households where a number of people rely on the same telephone line
for both Internet access and voice telephony, this may act as a disincentive for use of the
Internet, since when on-line the Internet user will monopolise the telecommunications
facilities by preventing either outbound or inbound calls to be made or taken.

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A possible solution to this problem, which is far from ideal, is the installation of a second telephone line. This involves additional installation costs and running costs.

An alternative to the installation of a second telephone line is the installation of a more
5   expensive upgrade to a standard line (e.g. installation of an ISDN line) which allows two calls to be maintained simultaneously.

The "Call Manager" software from Nortel Networks Corporation enables a PSTN exchange to send a message to an Internet user's PC client software when an incoming call is waiting.
10   A drawback with this solution is that the telephone company must upgrade the PSTN exchange equipment to provide this message to the user's PC.

Summary of the Invention

The invention provides a call waiting indicator having a tone detector which is associated with a computer which has a telephony connection. The tone detector receives an input from
15   the telephony connection and identifies or determines a signal which is indicative of a waiting call. A signal generator connected to the tone detector is configured to generate a signal to software resident on the computer upon detection of a call waiting signal, so that the software can alert a user of the computer via an output device of the computer that a call
20   waiting signal has been detected..

Without having to make any modifications to the PSTN exchange, therefore, the invention enables a computer user to be alerted to the existence of a waiting call. Very little modification is required to the user's computer system, other than the addition of the call
25   waiting indicator which may be embodied on a "plug and play" PC card. The card can communicate with software on the computer which generates the user alerts.

The tone detector preferably comprises an audio signal sampler for sampling the input signal, a sample store for storing a sample call waiting signal, and a matching unit for determining whether a match exists between a sample of the input signal and a stored sample.

The call waiting indicator may also include a configuration unit for selecting one or more sample signals from a number of available signals and for storing the selected signal(s) in the sample store.

In this way, the indicator, or a piece of software accompanying the indicator, may be supplied
5   to users with a database of sample signals, and the sample(s) matching the call waiting signal(s) generated by the user's telephony provider can be selected and stored for comparison. This could be done by associating with each sample the names of the telephony providers in each country who use that particular signal. It could also be done automatically by the software in a configuration program in which the user is requested to place an
10   incoming call to the telephony connection when the connection is active, so that the software can recognise the tone and determine the best match.

Preferably, the signal generator communicates with alert generation software resident on the computer, the software including instructions effective to recognise a signal from the signal generator and to generate an alert to a user of the computer via said interface.

15   Alternatively, the signal generator could communicate with the operating system of the computer and include a command generator for generating a command to the operating system causing the operating system to generate the alert.

The invention also provides a computer system comprising:

a)   a port for a telephony connection;

20   b)   a processor;

c)   a telecommunications manager for managing the transfer of data between the processor and the port;

d)   a user interface connected to the processor comprising at least an output device capable of issuing an alert to a user;